CURRENT LITERATURE.

Minor Notices.

MR. H. L. RUSSELL conducted a series of experiments in the winter of 1888–'89 to determine the character of bacteria in the ice of Lake Mendota, at Madison, Wis. From his paper[1] we learn that no pathological germs were present; that the freezing destroys about sixty per cent. as compared with the number found in the water; and that no relation exists between the number of germs in clear ice and snow-ice, in some cases a larger number being found in clear transparent ice than was found in any sample of snow-ice. The experiments are to be continued this winter.

MR. TH. HOLM describes[2] the mode of propagation of Hydrocotyle Americana by tuberiferous stolons, and gives an account of their structure, with references to the descriptive works where this mode of propagation is either not noticed or barely hinted at. Curiously, however, he fails to notice that in Coulter and Rose's Revision of the Umbelliferæ the occurrence of these tubers is made a specific character. The plates which accompany his paper are excellent. We hope he will carry out his intention of recording more such "notes."

IN THE *Proc. Boston Soc. Nat. Hist.* for 1889, Mr. A. B. Seymour prints a list of the fungi which he collected along the line of the N. P. R. R. at various points in 1884. One new species is described, Uromyces Alopecuri, on Alopecurus geniculatus, var. aristatus at Brainerd, Minn., and one new variety, Sorosporium Ellisii, var. occidentalis, on Andropogon furcatus at Bismarck, Dak.

NOTES AND NEWS.

DR. J. H. WAKKER, of Utrecht, has been appointed professor of botany at the dairy school at Oudshoorn, Holland.

DR. F. NOLL, assistant at Würzburg under Prof. Sachs, has been called to a professorship of botany at the University of Bonn.

DR. G. VON LAGERHEIM, attaché of the botanical laboratory of the University of Lisbon, has been called to the professorship of botany in the University of Quito.

THE GREAT book establishment of F. A. Brockhaus, in Leipzig, has issued its 1889 catalogue of second-hand botanical works. It is a classified list of over 3,400 titles, issued in four parts, which will be sent free upon request.

[1] Preliminary observations on the bacteria of ice from Lake Mendota, Madison, Wis. Reprinted from *Medical News*, August 17, 1889. Repaged. pp. 15.

[2] Notes on Hydrocotyle Americana.—Extracted from Proc. Nat. Museum, xi. pp. 455-462, pl. xvi and xvii.

A. MUNTZ states (*Comptes Rendus*, cix. 646), as the result of a series of experiments, that the higher plants can absorb ammoniacal nitrogen directly by their roots, and that the nitrification of ammoniacal manures is not an indispensable condition to their utilization.

WHEREAS THE seedlings of most Conifers produce chlorophyll, even when grown in the dark, Molisch has recently shown that those of Gingko biloba show only traces of it under such conditions. Thus the etiolation which is exceptional among the larches, firs and pines becomes normal in the Gingko.

A GIGANTIC fig tree is described and figured in *Gardeners' Chronicle* (Oct. 26). It grows in the garden of the old Capuchin Convent at Roscoff, N. W. France. It is $2\frac{1}{2}$ feet in diameter, $3\frac{1}{2}$ feet from the ground, and the spread of branches is 80 feet. The limbs are supported on stone and wooden pillars.

IN A RECENT NUMBER of *Science* Dr. Goodale's Toronto address upon "Protoplasm" was printed in full. As it was evidently set up from the pages of the GAZETTE a reference to that fact was looked for, but in vain. The occasional abstraction of a short note without credit is not seriously objected to, but the wholesale appropriation of a leading article is somewhat bewildering. Legal rights are not referred to, but common courtesy.

DZIEWULSKI has redetermined the specific gravity of wood fibers. Those of deciduous trees vary between 1.540 and 1.560; of coniferous trees, between 1.535 and 1.555. After complete removal of the resin, however, the latter become 1.560. Curiously enough, with few exceptions, the specific gravity of the fibers from the softer deciduous trees is higher than that of the hard woods. In general the results confirm those of Sachs and Hartig.

DR. HERMANN DINGLER has lately published an elaborate monograph on the movements of the winged organs of plants. He treats the mechanics of the free fall of such winged structures, determining the rate of fall in still air. In the more perfectly developed wings the rate is from 2 to 6.5 times slower than when the organ is deprived of its wings. He distinguishes twelve types of wings, using the word in such a broad way as to include the adhering layer of air, which by reason of their small size retards the fall of spores and small seeds. Of course these types have numerous intergradations.

AERENCHYMA is the name of a tissue homologous with cork, which Dr. H. Schenck describes in *Pringsheim's Jahrbücher*, xx. 526. It occurs in marsh plants on submerged parts of the stems, arising from the phellogen usually. The cells have thin walls (not suberized) and contain protoplasm, nucleus, a large vacuole with clear cell-sap, minute leucoplasts, in some cases starch grains, but never air. They are in contact with each other only in small areas, and therefore have very large intercellular spaces which are filled with air. As the tissue develops it ruptures the epidermis and primary contex, so that the intercellular system comes into communication with the exterior by numerous pores and rifts, into which, however, the water never penetrates. The air in these spaces contains a large percentage of oxygen (30 p. c. in Lythrum salicaria) and it is safe to conclude that this tissue aids in supplying oxygen for the respiratory needs of the submerged parts of plants. In some other plants the abundant development of lenticels on the submerged parts or the formation of aërotropic roots or of pneumatodes seems to subserve the same function.

SHORTIA has long been regarded as one of the rarest plants in the North American flora. Now, however, it is known to be so common, in at least one region, that a long established vernacular name for it is in common use among the few families of mountaineers who inhabit the valleys at the headwaters of the Savannah river, where Shortia is found. Galax, the near relative of Shortia, is known almost universally to the people of the southern Alleghany Mountains as Coltsfoot, from a fancied resemblance of the leaf to that of a colt's foot The smaller leaf of Shortia, which resembles somewhat the leaf of Galax, is called "Little Coltsfoot."—*Garden and Forest.*

NORTH AMERICAN ROSES furnish a subject for Dr. G. N. Best in the *Journal of the Trenton* (N. J.) *Natural Hist. Soc.* (Jan., 1889). He considers their classification, and well expresses its difficulty by his opening sentence: "To the botanist who yearns to enrich synonymy, the roses offer at once an inviting and productive field." He recounts the sending to Sir Joseph Smith by Amos Eaton of three specimens from the same bush, two of which were referred by that distinguished botanist to two described species, and the third described as a new species. With such facts can it be wondered at that "the study of roses is in its infancy"? It may be a serious question whether there are species among roses. Dr. Best appends a classification, which is a modification of M. Crèpin's.

BOKORNY finds (*Prings. Jahrbücher*, xx. 427) that the phenomenon of "aggregation," first described by Darwin as taking place in the cells of the tentacles of Drosera when treated with a very weak solution of ammonium carbonate, is quite widespread, occurring in phanerogams and algæ of the most diverse families. It can be produced by almost any substance of a basic nature. He distinguishes four modes of aggregation, (*a*) contraction of the entire plasma, (*b*) contraction and division of the vacuole wall or tonoplast, (*c*) the extrusion of minute droplets of proteids from the cell-sap and their fusion into larger masses, and (*d*) similar separation of the proteids of the plasma. These forms of aggregation do not usually occur singly in any cell, and probably depend on the transition of the proteids from a swollen condition to a denser, on account of a loss of water induced by the basic substance. As to the biological significance of the phenomenon, he ventures no opinion.

THE DEATH is announced of Mr. John Ball, the distinguished English botanist. His studies were devoted largely to botanical geography and to philosophical questions relating to the origin and descent of existing floras. Mr. Ball's best known works are "The origin of the Flora of the European Alps," published in 1878, and his "Contributions to the Flora of the Peruvian Andes, with remarks on the history and origin of the Andean Flora," published in 1885, in the journal of the Linnæan Society. He accompanied Sir Joseph Hooker, in 1871, in his scientific mission to Morocco, publishing on his return a catalogue of the plants discovered, with critical introductory observations (his first attempt to explore the chain of the Greater Atlas was made as early as 1851). Mr. Ball traveled extensively and was a practiced and accurate observer, and one of the very best books of recent travels is the one in which he described his South American journey, which carried him around that continent. Mr. Ball was in North America in 1884 at the meeting of the British Association at Montreal, and of the American Association at Philadelphia, later, accompanying his old friend and correspondent, Dr. Asa Gray, on the last journey the Cambridge professor made to Roan Mountain and other points of botanical interest in North Carolina. Mr. Ball belonged to a school of botanists of which only a few members remain; and he was almost the last of his associates and contemporaries.—*Garden and Forest.*

IN AN EXTENSIVE paper on the chlorophyll-free humus plants and their biological and anatomical relations (*Prings. Jahrbücher*, xx. 475) Dr. Friedrich Johow gives first an account of the geographical distribution of the 43 phanerogamic genera and 162 species. They are essentially plants of the tropics, 121 species belonging to these regions, about 55 of these occurring in tropical America. One is found in antarctic America; about 25 in North America. After giving an account of the habitat, habit and gross anatomy, the anatomical peculiarities are discussed. Naturally the most aberrant organ is the root. On the roots of all holosaprophytes, with one exception, root-hairs are wanting. The cortex is strongly developed. The central cylinder differs from most roots in the altered grouping of the xylem and phloëm regions, the reduction of the vascular portion, or the incomplete differentiation of the procambium elements. The roots almost without exception are associated with a fungus, producing the mycorhiza of Frank. The epidermis of the shoot of all holosaprophytes, with the exception of Epipogum aphyllum, shows *no stomata*, and the cortical parenchyma has small intercellular spaces or none. The mechanical system of the stem is represented only by a simple sclerotic ring outside the vascular bundle. The paper closes with an account of the embryology of the various orders. In all the embryo of the very small seeds is extremely rudimentary. In one case the endosperm consists of three cells and the embryo of three!

THE WESTERN SOCIETY of Naturalists held its second annual meeting at Madison, Wisconsin, October 23 and 24. There were fewer in attendance than at the first meeting, but the sessions were of marked interest. The botanical papers presented were as follows: J. C. Arthur, Laboratory facilities for the study of physiology; C. E. Bessey, What to do with a beginner in botany; E. A. Birge, Elementary bacteriology in general college courses; C. R. Barnes, Recent methods in embryology and histology. The President's address was delivered on Wednesday evening on the topic, The method of multiple working hypotheses in investigation, instruction and citizenship. After the address an exhibition of the powers and adaptability of the Wright & Newton electric microscope for the projection of microscopic sections of rocks, minerals, plants and animals was given in the geological lecture room. A section of the fibro-vascular bundle of the pumpkin was shown under a magnification of about 10,000 diameters, the large pitted vessels appearing about three feet in diameter. Nuclei of the root tip of the bean were shown three inches in diameter. The constitution was amended so as to bring the annual meeting hereafter in November, instead of October. Purdue University, La Fayette, Indiana, was selected as the next place of meeting, with Dr. C. E. Bessey as president, and Dr. J. S. Kingsley as secretary. The afternoon of Thursday was devoted by members to the inspection of the laboratories and museums of the University.

DR. ADAM PRAZMOWSKI summarizes in the *Biologisches Centralblatt* (ix, 417) his recent results in the study of the root tubercles of the Leguminosæ. The chief points may be stated thus: The tubercles are not normal structures but are due to the infection of the very young rootlets with bacteria. These bacteria may be obtained in pure cultures from the young roots and may be cultivated in nutritive solutions to thousands of generations. They show no diminution of their power under such cultivation. If the root is not infected when very young it remains to the end of its life free from the tubercles. The bacteria penetrate the cell wall of the root hairs and epidermis, and multiply therein

at the cost of their contents. When they have multiplied to large numbers in the root hair they accumulate near the apex of the hair as a tubular conglomerate of colonies which surround themselves with a thick membrane. After a time of development this structure grows toward the base of the root hair like a hypha-tube, and from this time on behaves like a true hyphal fungus. The tube has the thick, refractive membrane on the outside, and is densely filled with bacteria inside. It penetrates to the interior of the rootlet and induces the abnormal development of certain tissues, resulting in the formation of a tubercle. After the tissues of the tubercle have differentiated part of the tubes are dissolved and the bacteria set free, while part remain. The free bacteria multiply freely and take on a somewhat different form (forked) when they constitute the well-known "bacteroids." As to the rôle of the bacteria in the life of the plant, the author agrees with Hellriegel, that they enable the plant to obtain nitrogen, but whether this is taken in the form of compounds or from the free nitrogen of the air, he is not prepared to say. The remaining life history of the bacteria has also been worked out by the author, but we can not go further into details. The summary is a most interesting contribution to this important controversy.

IT IS STARTLING to compare a past in which botany was regarded as a subject which might be tacked on anywhere, with its present condition, in which there is scarcely a seat of learning in the three kingdoms which is not turning out serious work. But it would be a mistake to suppose that English modern botany has developed a character of its own in which the indirect influence of Darwin's later work can be not indistinctly traced. Darwin by his researches on insectivorous plants and plant movements from a purely biological point of view, prepared the way for this. Gardiner followed with a masterly demonstration of the physical continuity of protoplasm in plant tissues. Mr. F. Darwin has started what is virtually a new conception of the process of growth. On the whole, English botanists have shown a marked disposition to see in the study of protoplasm the real key to the interpretation of the phenomena of plant life. The complete analogy between the processes of secretion in animals and vegetables, established by Gardiner, and the essential part played by ferments in vegetable nutrition, illustrated by Green, are examples of the results of this line of inquiry.—*Nature.*